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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/620,927	07/16/2003	Eun-Seok Choi	51876P359	8868

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EXAMINER	
VOCKRODT, JEFF B	

ART UNIT	PAPER NUMBER
2822	

DATE MAILED: 03/31/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/620,927	CHOI ET AL.	
	Examiner	Art Unit	
	Jeff Vockrodt	2822	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *16 July 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-11* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-8,10 and 11* is/are rejected.

7)☒ Claim(s) *9* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *16 July 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

This office action is in response to the application papers filed on July 16, 2003. Claims 1-11 are pending.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-5, and 11 are rejected under 35 U.S.C. 102(e) as being anticipated by US 6,576,527 ("Nakmura").[1]

Nakmura discloses a peripheral contact electrode (Fig. 36) and method of making it (Figs. 37A-37C), wherein the contact is formed in a DRAM process and utilizes simultaneous construction with the DRAM capacitor.

Claim 1. Nakmura teaches forming a lower contact electrode (pillar shaped conductor 48); forming a metal oxide (thin dielectric 52--not labeled--that can be a metal oxide such as Al2O3, col. 19, ll. 10-23); forming an inter layer dielectric (58) and planarizing the interlayer dielectric 58 using nitride layer (50) as a stop; and forming an opening (100) by removing portions of the dielectric along the sidewalls of the contact electrode.

Claim 2. The metal oxide can be aluminum oxide (col. 19, ll. 10-23).

Claim 3. Nakmura teaches that layer 52 can be 0.1-4nm (1-40 angstroms) (col. 44, ll. 8-15).

Claims 4-5. The selective etching uses a mixture of HF and nitric acid and boiled phosphoric acid (col. 37, ll. 28-37).

Claim 11. PZT can be used as the dielectric 52. (col. 19, ll. 10-23).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 6-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakmura in view of U.S. 5,337,207 ("Jones").

Nakmura is discussed in relation to claims 1-5 and 11 above. Nakmura teaches that layer 52 can be a number of metal oxide films (col. 19, ll. 10-23) and sets forth wet etch chemistries including HF and nitric, and boiled phosphoric acid (col. 37, ll. 28-37). Nakmura does not teach that the etch is 1-50% in concentration or whether it contains peroxide.

Jones teaches a HF and nitric etching composition having less than 1% HF and 1-5% nitric and 0 to 50% hydrogen peroxide (col. 7, ll. 10-15) as useful for etching dielectrics.

It would have been obvious to one of ordinary skill in the art to use an etching composition having 0 to 50% hydrogen peroxide, 1%HF, and 1-5% nitric in the process of Nakmura. One of ordinary skill in the art would have been motivated to use these etching compositions as they were taught to be useful by Jones.

[1] Applicant is hereby notified that JP 10-189912 is the Japanese counterpart to Nakmura and is prior art under 35 USC § 102(b).

Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nakmura in view of U.S. 5,566,045 ("Summerfelt") and US 2002/0109168 ("Kim").

Nakmura teaches that the pillar-shaped conductor can be platinum, iridium, and metal oxides and that combinations of the above materials can be used (col. 18, ll. 34-49). Nakmura does not teach sequentially forming Pt/IrOx/Ir.

Summerfelt teaches stacked electrode structures 34/36/40 from which Pt/IrOx/Ir can be chosen from a list (see Table cols. 10-15).

Kim teaches that Pt/IrOx/Ir electrodes are particularly advantageous (¶ 25) for use with ferroelectric capacitors.

It would have been obvious to form the capacitor lower electrode (and consequently the pillar shaped conductor) from a Pt/IrOx/Ir layer in the method taught by Nakmura. One of ordinary skill in the art would have been motivated to use a Pt/IrOx/Ir electrode by Kim's teaching that such electrodes were preferred for making ferroelectric capacitors.

Allowable Subject Matter

Claim 9 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The following is a statement of reasons for the indication of allowable subject matter: The portion of Nakmura that is applied to claim 1 is a peripheral contact structure and does not form a ferroelectric layer over the lower electrode and inter layer dielectric film as required. The other portions of Nakmura (not relied on) that relate to capacitors do not teach limitations such as "removing only the metal oxide layer" that are recited in claim 1.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

US 6,093,575 and US 6,699,725 are cited as showing ferroelectric capacitors integrated within semiconductor circuits.

Any inquiry concerning communications from the examiner should be directed to Jeff Vockrodt at (571) 272-1848. The examiner can be reached on weekdays from 9:30 am to 5:00 pm EST. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amir Zarabian, can be reached at (571) 272-1852.

The fax number for official correspondence is (703) 872-9306. Unofficial communications to the examiner may be faxed to (571) 273-1848. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist at (703) 308-0956.

March 12, 2004
J. Vockrodt

AMIR ZARABIAN
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